CLAIMS

[1] A method for producing recycled pulp characterized in that bubbles are generated by cavitation and contacted with a pulp suspension to strip a contaminant deposited on pulp fibers and inorganic particles during the process of recycling waste paper.

[2] The method for producing recycled pulp of claim 1 characterized in that cavitation is generated by using a fluid jet.

[3] The method for producing recycled pulp of claim 2 characterized in that the pulp suspension and bubbles are contacted by emitting the pulp suspension as a fluid jet.

[4] The method for producing recycled pulp of any one of claims 1 to 3 wherein the contaminant is ink.

[5] A method for producing recycled pulp characterized in that bubbles are generated by cavitation and contacted with a pulp suspension to strip and separate a contaminant deposited on pulp fibers and inorganic particles in any one or more steps of the process of recycling waste paper comprising the step of stripping ink by cavitation and the subsequent step of removing ink by flotation and/or washing.

[6] The method for producing recycled pulp of any one of claims 1 to 5 wherein the condition in which a jetting liquid is emitted to generate cavitation is represented by a cavitation number σ in the range of 0.001 or more and 0.5 or less expressed by equation (1) or (2) below:

$$\sigma = \frac{p_\infty - p_v}{\frac{1}{2}\rho U_\infty^{\,2}} \qquad (1)$$

where p_∞: pressure of normal flow, U_∞: flow rate of normal flow, p_v: vapor pressure of fluid, ρ: density, or

$$\sigma = \frac{p_2 - p_v}{p_1 - p_2} \cong \frac{p_2}{p_1} \qquad (2)$$

where p_1: nozzle upstream pressure, p_2: nozzle downstream pressure, p_v: saturated vapor pressure of sample water.

[7] The method for producing recycled pulp of any one of claims 2 to 6 wherein cavitation is generated by emitting a jetting liquid via a nozzle or an orifice tube and the pressure of the jetting liquid (upstream pressure) is 0.01 MPa or more and 30 MPa or less.

[8] The method for producing recycled pulp of any one of claims 2 to 7 wherein cavitation is generated by emitting a jetting liquid via a nozzle or an orifice tube and the jet flow rate of the jetting liquid is 1 m/sec or more and 200 m/sec or less.

[9] The method for producing recycled pulp of claim 5 characterized in that the process of recycling waste paper is a deinking process.

[10] A pulp produced by the method of any one of claims 1 to 9, or a paper or coated paper using said pulp.

[11] A method for modifying pulp fiber surfaces and dirts or stripping dirts deposited on pulp fiber surfaces without damaging pulp fibers by means of the collapse

pressure of bubbles of cavitation generated by emitting a pressurized jetting liquid to a material comprising pulp fibers in a vessel.

[12] A method for modifying pulp fiber surfaces and dirts or stripping dirts deposited on pulp fiber surfaces without damaging fibers by means of the collapse pressure of bubbles of cavitation generated by emitting an aqueous slurry containing pulp cellulose as a pressurized jetting liquid to a material comprising pulp fibers in a vessel.

[13] The method of claim 11 or 12 characterized in that the jetting liquid for generating cavitation is emitted via a nozzle into a vessel having a material comprising pulp fibers and the pressure of the jetting liquid (nozzle upstream pressure) is 0.5 MPa or more and 30 MPa or less and the pressure in the vessel in which pulp cellulose is treated (nozzle downstream pressure) is 0.05 MPa or more and 0.3 MPa or less, and the ratio of the pressure in the vessel to the pressure of the jetting liquid is 0.001 - 0.5.

[14] The method of any one of claims 11 to 13 wherein the consistency of the material comprising pulp fibers in the vessel is 0.01 - 20% by weight.

[15] A pulp processing equipment comprising a vessel; one or more nozzles for emitting a pressurized jetting liquid to a material comprising pulp fibers present in the vessel; a pressure control mechanism located upstream of the nozzle to control the discharge pressure of the nozzle; and a pump located upstream of the pressure

control mechanism to apply a discharge pressure on the nozzle.

[16] The pulp processing equipment of claim 15 wherein the vessel has a form selected from the group consisting of closed, non-closed, batch or continuous type.

[17] The pulp processing equipment of claim 16 wherein the vessel is a closed type vessel capable of controlling pressure and has a mechanism controlling the pressure in the vessel while discharging liquid from the vessel as appropriate.

[18] The pulp processing equipment of claim 17 wherein the vessel has a liquid inlet other than the nozzle.

[19] The pulp processing equipment of claim 15, 16 or 17 characterized in that the inner wall of the vessel to which the nozzle is fixed is cone-shaped, whereby the pulp suspension is homogeneously agitated by dynamic vortex.

[20] The pulp processing equipment of any one of claims 17 to 19 characterized in that it has a liquid channel returning liquid to the vessel from downstream of the liquid channel connected to the liquid outlet of the vessel through the separating means.

[21] The pulp processing equipment of any one of claims 17 to 19 characterized in that the liquid channel connected to the liquid outlet is a two- or more forked liquid channel and at least one of the forks is connected to the nozzle in the vessel via the separating means so that liquid can be jetted into the vessel again.

[22] The pulp processing equipment of any one of claims

16 to 21 characterized in that it has a mechanism for maintaining the liquid entering the vessel and the liquid exiting it at the same amount to keep the level of liquid present in the vessel constant.

[23] The pulp processing equipment of any one of claims 20 to 22 characterized in that the separating means is any one of a flotator, washer, screen or cleaner.

[24] The pulp processing equipment of claim 14 characterized in that the vessel is any one of a flotator, washer, screen or cleaner.